

# MFJ-819

MOBILE SWR/WATTMETER

INSTRUCTION MANUAL

PLEASE READ THIS MANUAL BEFORE OPERATING THIS EQUIPMENT!

## MFJ ENTERPRISES

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## **OPERATION**

The **MFJ-819** SWR/Wattmeter's unique two-unit design, with a control unit and a remote sensor, permits convenient "remote" placement of the sensor in both mobile and home stations.

The **MFJ-819**'s cross needle meter displays peak or average FORWARD power, peak or average REFLECTED power, and SWR, all simultaneously. The control unit's **REF IND** (Reflected Indicator) is a warning lamp for low and high-power operation; the lamp illuminates when a factory setting of 2:1 VSWR is reached. To change the factory default see **ADJUSTING REF IND**.

A 12 volt DC power source is required for the meter to function. An external 12 VDC source can be provided via a jack on the sensor unit, or a 9 VDC battery can be installed inside the control unit. When an external power source is used the unit is enabled at all times and comes on when RF is sensed. When battery power is used, the battery is connected by the PWR ON/OFF pushbutton. Under battery power, the meter lamp and **REF IND** indicator lamp do not function, to conserve battery life.

Full scale forward and reflected power range is selected by the **RANGE HIGH/LOW** pushbutton. If your transmitter runs more than 300 watts of peak output power, set this switch to the 3000 watt, **HI** position (in). If your transmitter runs less than 300 watts peak output power, set the push button to the 300 watt, **LOW** position (out). Peak envelope power (PEP) is measured by placing the **PEAK/AVG** switch in the "in" position.

Peak and average power values are equal with steady unmodulated carriers such as closed-key CW, RTTY, FSK, or FM. The meter reading on these modes will be the same in either peak or average modes. On SSB, the ratio of PEP to average power varies with different voice and modulation characteristics. With most voices the PEP reading is three to five times higher than the average voice power reading.

The left hand FORWARD meter scale displays forward power in a scale from 0 to 300 watts. In the LO power position the reading is directly. Each picket (scale mark) represents 5 watts below 10 watts, 10 watts between 10 and 100 watts, and 25 watts between 100 and 300 watts. In the HIGH power position, multiply the meter reading by ten.

Power readings are most accurate over the upper half of the meter scales. When measuring power with less than a perfect match, subtract reflected power from forward power to measure the true power.

SWR is read directly from nine red SWR curves that range from 1:1 to infinity. SWR is indicated at the point where the forward and reflected meter pointers cross. The SWR is indicated by the red curve closest to the pointer crossing point. No cumbersome SWR sensitivity adjustments are required with this meter.

The power meter is backlit with an internal lamp only when using non-battery power. The 12 Vdc jack on the sensor unit accepts a 2.1 mm coaxial plug with the center conductor positive and the sleeve negative, for powering both the meter lamp and the control unit circuitry. The control unit and sensor are connected by a 25 foot length of flexible cable (supplied), terminated at both ends in telephone-style RJ-45 plugs.

## **INSTALLATION**

1. A power source must be connected for the power meter to operate. There are two choices:
  - a. Connect a 12 Vdc power source to the back of the sensor marked 12 Vdc. This method will supply power to the meter lamp and REF IND. The power switch operates the meter lamp. The meter circuit will still work with the switch in the off position.
  - b. Remove the back cover of the meter box and connect a standard 9 volt battery to the battery snap. Place the battery into the metal holder, and replace the cover. When a 9 volt battery is used as the only power source, the meter lamp and REF IND will not function. The power switch switches the internal battery on/off.
2. Locate the wattmeter and sensor in a convenient location.
3. Connect the Sensor box to the operating station with good quality coax.
4. Use the supplied patch cable and connect the sensor to the meter box.

## **ADJUSTING REF IND**

The REF IND can be adjusted to come on between 1.3:1 to 6:1 VSWR (factory setting is 2:1 VSWR)

There are two different ways to make this adjustment:

**Option 1: Change the indicator setting with a digital DC volt meter.**

1. Connect the **MFJ-819** to a 50 ohm load. (see installation if needed)
2. Remove the back cover of the control unit.
3. Place Range positions to LOW and AVG.

Note: A digital DC volt meter will be needed for the following steps.

4. Refer to Figure 1. Apply enough RF to indicate 100 watts on the forward meter scale and measure the voltage at **TP1** (nominal .9 volts). Make a note of this voltage. Voltage A \_\_\_\_\_

Note: Raising the voltage at TP1 will make the indicator come on at a higher VSWR. Lowering the voltage at TP1 will make the indicator come on at a lower VSWR.

The follow chart will tell how much to raise or lower the voltage measured in step 4 by adjusting VR102. (Figure 1)

example. Let say the voltage in step 4 was 1.0 volt. To make the REF IND come on at 1.5:1 VSWR then the voltage should be adjusted .3 volts less than 1.0 (voltage A) = .7 volts.

0.6 volts more than voltage A	=	2.5:1 VSWR
voltage A	=	2:1 VSWR
0.3 volts less than voltage A	=	1.5:1 VSWR
0.6 volts less than voltage A	=	1.3:1 VSWR

**Option 2: Tuning an antenna tuner to the desired VSWR..**

1. Connect the **MFJ-819's** Transmitter connector to the transceiver's RF OUT (antenna) connector.
2. Connect the **MFJ-819's** antenna connector to the input of the antenna tuner.
3. Connect power and patch cable to **MFJ-819** (see installation).
4. Connect the antenna tuner to a dummy load or antenna.
5. Remove the back cover of the control unit and locate VR102 (refer to Figure 1).

6. Apply 10 to 100 watts of RF and adjust the antenna tuner to the VSWR that you want the light to come on.
7. While transmitting adjust VR102 until the light goes off then back to where the light just comes on.
8. Replace the cover and resume normal operating.

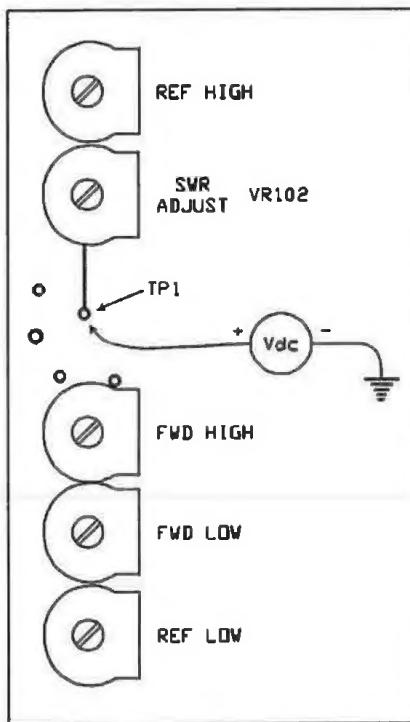
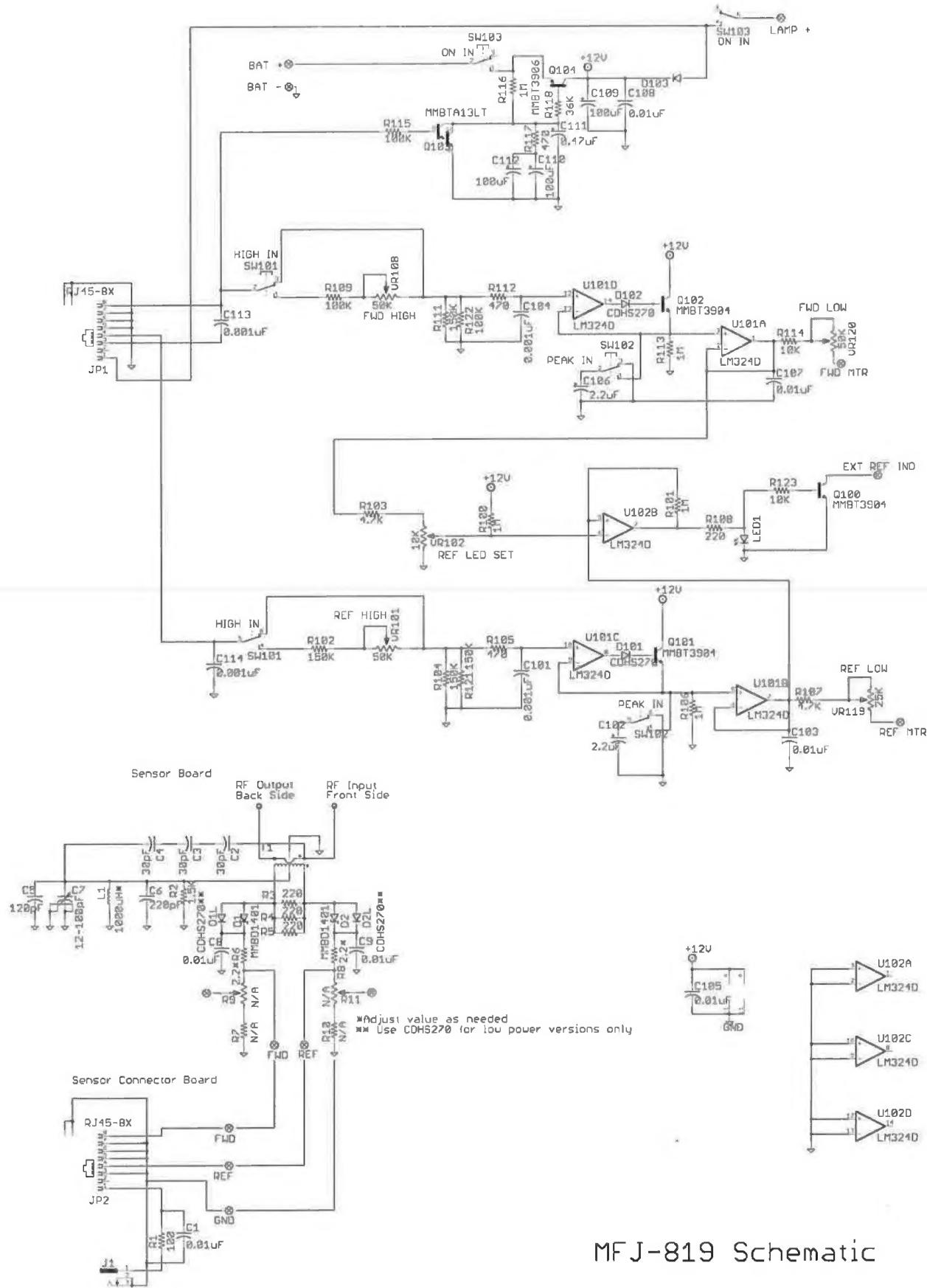


Figure 1

## TECHNICAL ASSISTANCE

If you have any problem with this unit first check the appropriate section of this manual. If the manual does not reference your problem or your problem is not solved by reading the manual, you may call *MFJ* at **662-323-5869**. You will be best helped if you have your unit, manual and all information on your station handy so you can answer any questions the technicians may ask.

You can also send questions by mail to *MFJ INC.*, 300 Industrial Park, Starkville, MS 39759; by Facsimile (FAX) to 662-323-6551, or email to [mfjcustserv@mfjenterprises.com](mailto:mfjcustserv@mfjenterprises.com) Send a complete description of your problem, an explanation of exactly how you are using your unit, and a complete description of your station.



## MFJ-819 Schematic

## FULL 12-MONTH WARRANTY

MFJ Enterprises, Inc. warrants to the original owner of this product, if manufactured by MFJ Enterprises, Inc. and purchased from an authorized dealer or directly from MFJ Enterprises, Inc. to be free from defects in material and workmanship for a period of 12 months from date of purchase provided the following terms of this warranty are satisfied.

1. The purchaser must retain the dated proof-of-purchase (bill of sale, canceled check, credit card or money order receipt, etc.) describing the product to establish the validity of the warranty claim and submit the original or machine reproduction of such proof of purchase to MFJ Enterprises, Inc. at the time of warranty service. MFJ Enterprises, Inc. shall have the discretion to deny warranty without dated proof-of-purchase. Any evidence of alteration, erasure, or forgery shall be cause to void any and all warranty terms immediately.
2. MFJ Enterprises, Inc. agrees to repair or replace at MFJ's option without charge to the original owner any defective product provided the product is returned postage prepaid to MFJ Enterprises, Inc. with a personal check, cashiers check, or money order for **\$12.00** covering postage and handling.
3. MFJ Enterprises, Inc. will supply replacement parts free of charge for any MFJ product under warranty upon request. A dated proof of purchase and a **\$8.00** personal check, cashiers check, or money order must be provided to cover postage and handling.
4. This warranty is **NOT** void for owners who attempt to repair defective units. Technical consultation is available by calling (662) 323-5869.
5. This warranty does not apply to kits sold by or manufactured by MFJ Enterprises, Inc.
6. Wired and tested PC board products are covered by this warranty provided **only the wired and tested PC board product is returned**. Wired and tested PC boards installed in the owner's cabinet or connected to switches, jacks, or cables, etc. sent to MFJ Enterprises, Inc. will be returned at the owner's expense un-repaired.
7. Under no circumstances is MFJ Enterprises, Inc. liable for consequential damages to person or property by the use of any MFJ products.
8. **Out-of-Warranty Service:** MFJ Enterprises, Inc. will repair any out-of-warranty product provided the unit is shipped prepaid. All repaired units will be shipped COD to the owner. Repair charges will be added to the COD fee unless other arrangements are made.
9. This warranty is given in lieu of any other warranty expressed or implied.
10. MFJ Enterprises, Inc. reserves the right to make changes or improvements in design or manufacture without incurring any obligation to install such changes upon any of the products previously manufactured.
11. All MFJ products to be serviced in-warranty or out-of-warranty should be addressed to **MFJ Enterprises, Inc., 300 Industrial Park Rd, Starkville, Mississippi 39759, USA** and must be accompanied by a letter describing the problem in detail along with a copy of your dated proof-of-purchase and a telephone number.
12. This warranty gives you specific rights, and you may also have other rights, which vary from state to state.